

Digital Phenotyping to Support Wellness in People With Bipolar Disorder

Submission Type Symposia

Topic Other: assessment

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Participant(s) Alex Leow (Chair), Maria Faurholt-Jepsen (Presenter), Alex Leow (Presenter), Debbie Huang (Presenter)

SUBMISSION DETAILS

Category Selection Application Research and/or Clinical Practices

Overall Abstract Details The episodic nature of bipolar disorder (BD) makes close monitoring and a flexible treatment approach crucial to helping patients achieve and maintain a high quality of life. Methods to monitor symptoms, especially during the maintenance phase of treatment, could enable swift intervention to prevent relapse and hospitalization. However, monitoring is only practical if it can be done in a low burden way. Digital phenotyping – a method of quantifying a person’s mental health status using data passively collected from their smartphone sensors – has great potential as a way by which to inform a responsive, personalized approach to managing BD.

This symposium will include three presentations on the clinical utility of digital phenotyping. The first presentation will describe the use of digital phenotyping to measure mood instability, which is associated with illness severity and functioning, and offers an objective way to assess outcomes in clinical trials. The second presentation will report on results from a trial comparing phone sensor data in adults with mood disorders to those with no mental health disorder. Group differences in cognition and phone use were evident even among those who were asymptomatic. The final presentation will describe findings from a longitudinal study of adolescents with BD. Active and passive data, including screen lock/unlock and GPS, indicate unique mobility and circadian patterns between BD and typically-developing youth.

These presentations highlight the potential of digital phenotyping as a way by which to support the diagnosis of people with mood disorders and to monitor their functioning over time.

Novelty/Unique Data These data are currently unpublished and represent the cutting edge of digital psychiatry.

Significance This novel approach has the potential to upend the way that people with bipolar disorder are identified and that their illness is managed over time.

DISCLOSURE

Disclosures

Financial Relationships

Disclosure No, I have nothing to disclose.

Digital Phenotyping to Support Wellness in People With Bipolar Disorder

Digital Phenotyping in Bipolar Disorder

Submission Type Symposia

Topic Other: assessment

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SUBMISSION DETAILS

Individual Abstract: Prospective monitoring of mood was started by Kraepelin who made and recorded frequent observations of his patients. Mood instability is of core pathogenetic significance in bipolar disorder, and during the last decade there has been a gradual shift from a focus on affective episodes to inter-episodic mood instability. A substantial proportion of patients with bipolar disorder experience between episodes subsyndromal mood swings on a daily basis. Data on mood instability, activity instability and irritability instability collected prospectively using smartphones from two large cohort studies will be presented during this symposium. During this symposium, we will look into the concepts of mood instability, activity instability and irritability instability. Further, we will look into the associations between these concepts as well as look into the associations between the concepts and perceived stress, quality of life, and functioning, respectively.

We propose self-reported mood instability as the primary or a central secondary outcome measure in randomized controlled trials as this imply several advantages: mood instability has internal validity as a real-life measure for patients and high external validity as it reflects patients' illness severity and functioning. Mood instability appears to be a more sensitive measure of outcome in RCTs than more conventional outcomes focusing on relapse or recurrence of affective episodes. The potential use of digital phenotyping using mood instability in RCTs will be presented and discussed during the symposium.

Keywords

Keywords
Digital health
Digital marker
Computational Phenotyping
Mood instability
physical activity

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DISCLOSURE

Disclosures

Financial Relationships

Disclosure No, I have nothing to disclose.

Digital Phenotyping to Support Wellness in People With Bipolar Disorder

Smartphone Derived Keyboard Dynamics and Accelerometry Data as a Window Into Brain Health

Submission Type Symposia

Topic Other: assessment

Submitter Alex Leow

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Participant(s) Alex Leow (Chair), Maria Faurholt-Jepsen (Presenter), Alex Leow (Presenter), Debbie Huang (Presenter)

SUBMISSION DETAILS

Individual Abstract: Our team has developed a customized, virtual smartphone keyboard which replaces the native smartphone keyboard. This technology allows us to passively and unobtrusively collect keystroke dynamics metadata (such as inter-key delay, autocorrect, and backspace usage), which has been shown to be sensitive to mood in individuals with bipolar and depressive disorders. Here, we further examine the feasibility of using accelerometer data exclusively collected during typing to study daily variations in mood and cognition. As part of an ongoing digital mental health study involving mood disorders, we collected data from a well-characterized clinical sample (N = 85) and classified accelerometer data per typing session into orientation (upright vs. non-upright) and motion (in-motion vs. not in-motion). The mood disorder group showed lower cognitive performance despite mild symptoms (depression/mania), as measured using the Trail Making Test (part B). There were also diurnal pattern differences with respect to cognitive performance: individuals with higher cognitive performance typed faster and were less sensitive to the effect of time of day (i.e., less slowing towards the end of the day). They also exhibited more well-defined diurnal patterns in smartphone keyboard usage: they engaged with the keyboard more during the day and tapered their usage more at night compared to those with lower cognitive performance, suggesting a healthier usage pattern of their phone.

Keywords

Keywords
Digital health
Bipolar Affective Disorders
machine learning
Processing speed
Smartphone

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Digital Phenotyping to Support Wellness in People With Bipolar Disorder

The Potential of Digital Phenotyping to Aid Early Identification of Bipolar Disorder

Submission Type Symposia

Topic Other: assessment

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SUBMISSION DETAILS

Individual Abstract: Introduction

People with bipolar disorder (BD) often go many years before receiving an accurate diagnosis and treatment. During adolescence, a period of great risk for BD onset, symptoms can be difficult to differentiate from depression or teenage “moodiness.” Digital phenotyping, which measures behavior and mental status using data collected from smartphones, provides objective information that may improve the efficiency of diagnosis. We evaluated the feasibility of this approach in adolescents with BD.

Method

Participants (aged 14-19) and their caregiver were interviewed monthly about the adolescent’s mood and behavior for 18 months. During this time, the adolescent used the Beiwe app, which collects surveys, location/mobility (GPS), and phone locked/unlocked status, among other data. We compared mood and behavioral features across the BD and typically developing (TD).

Results

Passive and survey data were obtained with minimal missingness among BD (n=28) and TD (n=23) participants. BD participants reported higher levels of negative mood ($t=4.2$, $p<.0001$) and anxiety ($t=3.8$, $p<.0001$). Average energy and positive mood were equivalent between the two groups. Inspection of behavioral features and screen lock/unlock data indicate unique mobility and circadian patterns between BD and TD participants.

Conclusion

Digital phenotyping is a feasible approach to collect objective mood and behavioral data from adolescents. This population, which is at high risk for the onset of a mood disorder and among whom smartphone use is ubiquitous, may be an ideal population for this approach. Data patterns differ across BD and TD adolescents and may have clinical utility for diagnosis and relapse prevention.

Keywords

Keywords
CHILDHOOD BIPOLAR
Dimensional diagnosis, Subthreshold bipolar, subthreshold hypomania,
technology
Digital health

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Disclosure No, I have nothing to disclose.